



## A News Report on the Health Effects of Electromagnetic Energy.

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### **EMF's, Melatonin and Breast Cancer ...is there a connection?**

According to recent statistics, breast cancer in Australia effects one in 14 women, kills one in 27 and is increasing at a rate of 3% annually. These figures reflect a growing community concern and as a consequence, in 1995 the Federal Government allocated \$3 million over a 3 year period, solely for breast cancer studies.

It is unfortunate however, that apparently no current Australian research is examining the growing evidence that low level exposures to 50-60 hertz electromagnetic fields (EMF) can reduce melatonin's ability to suppress breast cancer cells, thereby increasing susceptibility to breast cancer.

Melatonin is produced at night, darkness triggering its production. Among other things, it acts as a powerful anti-oxidant, eliminating free radicals which are implicated with cancer and other degenerative diseases. Melatonin also dampens the release of oestrogen, prolonged exposure to which may increase the risk of breast cancer.

In 1987 Stephens et al. in the paper Electric power use and breast cancer; a hypothesis. suggested that electromagnetic fields reduce melatonin production by the pineal gland and that melatonin suppresses the development of breast cancer.

Several researchers have also suggested that the possible suppression of melatonin by electromagnetic fields may provide a single mechanism for explaining how a number of different types of cancer could be promoted by EMF's, however this hypothesis has been hotly debated due to the previous failure to replicate several key studies. Replication is a key step in the scientific method for it takes an unproven hypothesis to a significant conclusion which can be acted upon.

The following significant findings of Liburdy and coworkers in 1993 have now been replicated three times. It is this replication and the significant implications it has for the success rate for breast cancer treatment, that calls for immediate action from researchers and oncologists alike. The failure to do so, under the excuse of "more research needs to be done" may well condemn many cancer patients to unnecessary suffering and possible death.

At the 18Th. Annual Meeting of the Bioelectromagnetics Society (BEMS), held in Victoria, Canada, June 1996, three studies were presented which have profound implications for the treatment of breast cancer.

**1) ELF INHIBITION OF MELATONIN AND TAMOXIFEN ACTION ON MCF-7 CELL PROLIFERATION; FIELD PARAMETERS.** J.D. Harland and R.P. Liburdy. Lawrence Berkeley National Laboratory, University of California, Berkeley, California, USA. This study was designed to define the parameters by which a 12 milli-Gauss (mG) magnetic field (ELF) can block the inhibitory action of melatonin and Tamoxifen, a widely used drug treatment for breast cancer.

**They found that a 12 mG field can significantly reduce the growth inhibitory action of melatonin and Tamoxifen on human breast cancer cells (MCF-7) in culture.**

"Preliminary experiments suggest that at least three days exposure at 12mG is necessary to block the cytostatic action of Tamoxifen (from 27% growth inhibition,  $p < 0.0001$ ; to 5% growth inhibition,  $p < 0.5$ ) indicating that prolonged 12mG exposure may be required. This appears to be consistent with a "slow" interaction mechanism. This result also raises the possibility of field effects that may be cell cycle dependent, since measurable effects appear to be delayed or reversible until cell division begins. In addition, all field magnitudes of 12 mG or higher that have been tested thus far (12mG, 20mG, 1 Gauss) have been effective at blocking melatonin."

**2) INDEPENDENT REPLICATION OF THE 12-MG. MAGNETIC FIELD EFFECT ON MELATONIN AND MCF-7 CELLS IN VITRO.** C.F.Blackman, S.G. Benane, D.E. House and J.P. Blanchard. National Health & Environmental Effects Research Laboratory, U.S. Environmental Protection Agency, USA.

This study was specifically designed to attempt to replicate the previous study, with the cooperation of the originating laboratory. The results independently confirmed the previous study's findings. As follows:

- 1) Melatonin can inhibit the growth of human breast cancer cells MCF-7 in culture.
- 2) A 12 mG 60 Hz magnetic field can completely block melatonin's oncostatic action.

The authors of this study believe these results are particularly significant because these findings represent the first replication of a key magnetic bioeffect, and that these two studies represents a foundation for theorists to generate "testable" hypotheses for biological mechanisms of interaction.

**3) INHIBITION OF MELATONIN'S ACTION OF MCF-7 CELL PROLIFERATION BY MAGNETIC FIELDS ASSOCIATED WITH VIDEO DISPLAY TERMINALS: A PRELIMINARY STUDY.** S.M.J. Afzal and R.P. Liburdy. Lawrence Berkeley National Laboratory, University of California, USA.

This study was undertaken to test the hypothesis that ELF and VLF magnetic fields associated with Video Display Terminals (VDT's) influence human breast cancer cell growth in vitro by altering melatonin's natural oncostatic activity. This hypothesis was based on the findings of the two previously mentioned studies.

The conclusions of this study appear to suggest that 12 mG VDT magnetic fields also inhibit the oncostatic action of melatonin in vitro and that the magnetic field component was the operative factor in the 12 mG 60 Hz exposures.

It does not necessarily mean that these in vitro study conclusions can be applied to actual human breast cancer patients. However in light of these three studies there should be concern and the need for urgent research, since levels of 12 mG or higher can easily be encountered in homes or

the workplace. These levels can be from a wide number of sources, of special concern however, are exposures over an extended time, especially at night. For example, the use of energized electric blankets will normally give exposures over 12 mG. **(To be continued in next issue)**

## Article 2

### **W.H.O. launches 5 year EMF review Project.**

The World Health Organization in May 1996 announced a 5 year review study to assess health and environmental effects of exposure to both extremely low frequency (ELF) fields and radiofrequency/ microwave (RF/MW) radiation.

This project has been initiated by WHO in response to growing concerns in many member countries over possible health effects from exposure to an ever increasing number and diversity of EMF/EMR.

According to WHO the project will provide authoritative and independent peer review of the existing scientific literature, and to identify and fill gaps in scientific knowledge by establishing protocols for the conduct of research, and encouraging more focused research that should lead to better health risk assessments. (WHO press release, May 1996)

## Article 3

### **Senate Committee Recommendations Reflect Community Concern on Towers.**

Senate Telstra Bill Committee recommends no further towers be constructed near schools until health risks are known.

In September 1996, the Senate Environment, Recreation, Communications & the Arts Committee released a report concerning the sale of Telstra (formerly Telecom), titled Telstra, to sell or not to sell?- Consideration of the Telstra (dilution of public ownership) Bill 1996. The following is quoted from under the section:

Health issues relating to aerial cabling and mobile phone towers:-

**(7.67)** "A significant number of submissions received from community and environment groups and local government associations expressed concern about the potential health hazards presented by electromagnetic radiation (EMR) emissions from mobile phone towers." ...

**(7.68)** "Australians have embraced the use of mobile phones and other new telecommunications technologies with great enthusiasm. In 1996, there were 3.3 million mobile phone subscribers, a teledensity by mid-1996 of approximately 17 per 100 population. Bearing this statistic in mind, it is incumbent upon the Government to ensure the safety of mobile phone users, and to provide early warning to users of any adverse health implications from the use of mobile phones or emissions from mobile phone telecommunications towers."

**(7.69)** "EMR may prove to be a hidden problem and is one which will not go away. The Committee is aware that community fears about the unknown effects of EMR have been

exacerbated by lack of access to detailed scientific and medical research into the potential effects of EMR in Australia."

(7.70) "CSIRO acknowledged these fears in 1994 when it recommended that there needed to be an 'orchestrated research effort' into the safety of EMR of telecommunications frequencies;...."

Further on the report mentions the DOCA Committee on EME and Public Health and goes on to say:

(7.77) "The EME Committee has no confirmed reporting date and no preliminary reports are available. In the meantime, as more and more telecommunications towers emitting EMR are erected in urban settings, concern is growing among those living and working in close proximity to such towers."

(7.78) "The Australian Local Government Association (ALGA) expressed its concerns to the Committee that aerial cabling and mobile phone towers may present a health hazard. ALGA recommended that an urgent examination of the most recent evidence on EMR exposure levels associated with mobile phone towers and other infrastructure was needed."

(7.82) "The Committee was concerned to learn that South Australian schools had accepted telecommunications towers on their premises in return for payments made by carriers. Figures of up to \$100,000 per tower were mentioned. The Committee received advice from the South Australian Government that the decision to locate telecommunications towers within school properties was a local management decision taken by school principals and school councils. The Department of Education and Children's Services had endeavored to support schools in the decision making process by seeking advice and information from the SA Health Commission."

(7.83) "Given the fact that the South Australian Government had admitted that it was concerned about the location of towers, and that equivocal advice and no information other than the current Australian Standard was provided by the Department of Education and Children's Services and the SA Health Commission to school councils, the Committee was astonished to learn that school's were allowed to approve the erection of towers on school property."

(7.86) "In view of the difficulties some witnesses had experienced, the SA Government was asked to respond to the Committee's questions in relation to health concerns and EMR, and funding of research into EMR on behalf of the people of South Australia."

(7.87) "The SA Government's view was that the Australian Standard (AS 2772.1-1990) and the National Health and Medical Research Council Guidelines specified the recommended limits for public exposure to EMR, and that the public's exposure was 'significantly lower than the recommended limits specified'. It concluded that present day levels did not 'represent a public health hazard requiring any corrective action'."

(7.88) "In regard to funding for research, the SA Government recognized the importance of advancing an understanding of the health risks of EMR, and that there was a need for further national and international research. The SA Health Commission would monitor the results of the WHO's 1996 International EMF Project..." (see articles on DOCA Committee & WHO 's EMF Project )

#### **RECOMMENDATIONS OF "TELSTRA" SENATE COMMITTEE:**

**"Recommendation 35:** The Committee recommends that a levy be raised from telecommunications and other industry contributors responsible for EMR emissions to finance independent research into public health issues concerning EMR."

**"Recommendation 36:** The Committee recommends that no further mobile phone towers and bases be constructed in proximity to kindergartens, schools and Hospitals, and in any location where people may be at risk from long-term exposure to electromagnetic radiation (EMR), until further research is undertaken that shows there is no risk to public health."

And finally to mention one of the conclusions of the Senate 'Telstra' Committee:

**(7.94)** The Committee is concerned that in pursuit of a higher sale price, the Government will not impose adequate environmental safeguards to address these broad community concerns."

## Article 4

### **Australian Government to fund study.**

The Australian Government is to provide \$4.5 million for a study into the health effects of mobile phones and other radio communications equipment.

From media release dated 16 Oct. 1996:

"The Government will provide \$4.5 million over five years for research and public information into health issues associated with mobile phones, mobile phone towers and other communications devices and equipment", the Minister for Communications and the Arts, Senator Richard Alston, and the Minister for Health and Family Services, Dr. Michael Wooldridge announced today.

The radiofrequency (RF) electromagnetic energy (EME) program, will be fully offset by a small increase in radio communications license fees to commence in November 1996.

"Sections of the public are concerned about possible adverse health effects from long-term exposure to RF EME - especially in regard to children - with the increased use of radio-based communications technologies, such as mobile phones" Senator Richard Alston said.

"Australia has one of the highest take-up rates of mobile phones in the world, with around four million in use around Australia. That number is expected to increase.

"However, survey work carried out by AGB McNair found that, of the more than 750 people who were interviewed, other health issues such as damage to skin through exposure to the sun, the development of breast cancer or death or injury because of road accidents were of greater concern.

"The AGB McNair survey found there was strong support for more information to be made available from the Government, and that there was strong support for further research into the EME public health issues."

Dr. Wooldridge said that while there is no substantiated evidence available, to date, of adverse health affects associated with RF EME exposure - within the standards that apply in Australia and overseas - there is still a need for further research and to provide information to the public.

"An important part of this project will be the provision of factual information about the use of mobile phones and about exposure levels," Dr. Wooldridge said.

"A committee of health, scientific and communications officials has already been established to examine and advise the Government on RF EME- related matters, including national and international research findings and the potential for further research.

"The RF EME risk management and communications program is concerned with implementing practical measures to address RF EME public health issues," Senator Alston said.

The program involves:-

\*The public dissemination of up-to-date information about RF EME public health issues.

\*Continuing Australian participation in the World Health Organization's project to assess the health and environmental effects of EME exposure.

\*The establishment of an Australian research program to examine RF EME issues of particular relevance to the Australian environment, to complement overseas research activities.

The research program will be managed by the National Health and Medical Research Council.

The RF EME Program will be coordinated jointly by the Communications and the Arts and Health and Family Services portfolios through the Committee on EME Public Health Issues. Program functions will be contracted out to appropriately qualified government and non-government bodies, such as the CSIRO, and universities and hospitals.

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Department's website: <http://www.dca.gov.au>.



Article 5

### **Commentary on the Government's \$4.5 million EME program.**

The Federal Government has taken a very positive step in this issue by implementing this program and is to be commended for this initiative.

However I have some concerns about certain aspects of this program which government members may not be aware of. If these concerns are not addressed soon there is the danger that much of this money will be wasted in areas that will give no real answers.

As I see it, there are several major questions this program must answer in relation to mobile phone transmitter base stations (towers) which are a major area of concern in Australia today.

1) Have adequate population health studies been carried out to give a fair indication that mobile phone base station transmissions are not harmful to nearby residents health? (eg. Workers and military personnel occupationally exposed to RF/MW radiation.)

2) Is there sufficient scientific evidence, to warrant caution, that long term exposure to the low level microwave transmissions from mobile phone base stations may be hazardous to health?

3) Will the World Health Organization's International EMF Project be able to answer the above questions after its 5 year study?

The Department of Communications and the Arts' (DOCA) Committee on EME and public Health mentioned in [our other editorial article](#), "**DOCA Committee not serious about consultative process**", is the same committee which will be coordinating the governments \$4.5 million dollar RF EME Program.

They will also have much influence in:- **a)** Contracting out various Program functions, including research projects. **b)** Advising the Government on RF/MW health related matters. **c)** Drafting and disseminating to the public, "up-to-date" information about RF/MW public health issues. This includes "factual information about the use of mobile phones and about exposure levels".

If the German information sheet Radio Signals, mentioned in the DOCA article (and which has been sent out by the EME Committee chair) is an example of their idea of "factual, up-to-date" information then we may see a monumental waste of government money.

What sort of public information sheets will this committee produce? Will there be a balanced presentation, or will it be as biased as the German Paper? It is hoped that there will be liaison with the CSIRO's Division of Radiophysics before sending out further information.

By the EME Committee's actions, in its apparent dismissal all evidence of possible health hazards in its public hearings, its competence to coordinate the RF EME Program is severely in doubt.

**Now lets consider question no.1: (The adequacy of existing population studies.)**

In determining an answer to this question, one obviously starts by looking at what international expert groups say.

The International Commission on Non Ionizing Radiation Protection (ICNIRP), chaired by Dr. Michael Repacholi, looked at this question in 1995 in its statement, *Health Issues Related To The Use Of Hand Held Radiotelephones And Base Transmitters*. This statement has been widely circulated by the South Australian Health Commission (SAHC) as evidence that there are no health risks associated with placement of mobile phone towers in schoolgrounds.

The SAHC has advised the SA Minister of Education to this effect. The SA Minister for Education has given permission to all state schools in SA that it is safe to allow the towers on school property. All this is largely based on the conclusions of the ICNIRP Statement.

The ICNIRP statement mentions three epidemiological studies which it relies upon for its conclusions:

**1) Robinette et al, 1980.** "A large scale study of radar workers involving over 40,000 people exposed for two years and followed up for twenty years failed to identify any increased incidence of illness or mortality associated with exposure."

**2) Lilienfeld et al, 1978,** "studied 1,800 employees and 3,000 dependents of the United States embassy in Moscow who were exposed to low level RF radiation in the embassy. They did not find significant adverse health effects in that population."

**3) Szmigielski et al, 1988 "** reported an increased risk of cancer in military personnel. However, the results of this study are difficult to interpret because neither the size of the population nor the exposure levels are clearly stated."

So out of three studies we have two negatives and a questionable positive. Largely on this basis the ICNIRP concludes :

"There is no substantive evidence that adverse health effects, including cancer, can occur in people exposed to levels at or below the limits on whole body average SAR recommended by INIRC (IRPA/INIRC 1988), or at or below the ICNIRP limits for localized SAR set out in this document."

If both the Robinette and Lilienfeld studies are indeed accurate then the ICNIRP statement would appear not to be unreasonable, however both these studies have been found to be severely flawed and are considered in non-industry scientific circles to be largely discredited. Investigations by Dr. John Goldsmith, Professor of Epidemiology, Ben Gurion University, Israel, illustrates this very well.

Dr. Goldsmith has undertaken a critical re-evaluation of the data from these two studies. Part of his research has been published in his paper Epidemiologic Evidence of Radiofrequency Radiation (Microwave) Effects on Health in Military, Broadcasting, and Occupational Studies. To briefly mention what he found:

**1) Robinette et al 1980:** A significant increase in leukemia in the most exposed group was diluted with a group with no increase with leukemia to give the combined group a small , but not significant increase. The abstract reports "No adverse effects....could be attributed to potential microwave exposure..."

According to Goldsmith, "The correct interpretation of this report is that among the group expected to have highest exposure there is a significant excess of hematological and lymphatic cancers'... **"The negative statement in the summary is a misrepresentation of the findings. All reviews which cite it are biased."**

2) Lilienfeld et al, 1978: (Obtained from the US State Department under the Freedom of Information Act). Quoting Goldsmith: "A study was done and reported Sept. 1967 of a group of 43 workers, (37 exposed and 7 not exposed) tested for abnormalities in chromosomes on stimulated division. 20 out of the 37 were above the normal range among the exposed, compared to 2/7 among the non-exposed. In a final report, the scientists urged repeat and follow-up which was clinically indicated for 18 persons, but was not undertaken by the end of the contract period,"

"A study of blood counts among exposed persons in Moscow, compared to comparable persons in Washington, reported to the State Department on October 7, 1976, and showed the statistical information was significantly different for Moscow subjects in almost every comparison."

"Data on exposure and occurrence of some cases of cancer were withheld from Prof. Lilienfeld until the report was complete, and it was too late to include in the results."

"The views of Prof. Lilienfeld were altered or deleted at the request of the contract officer..."

"Lilienfeld had urged that follow-up studies be done, since the latency period for some possible types of cancer had not yet been sufficient at the time of his survey."

"Reviews of the work done by the contract investigators were interpreted by consultants as inconclusive because the State Department had failed to complete the follow-up work recommended by its contractors."

Prof. Goldsmith concludes about the Moscow study that evidence was suggestive for four health effects:-

**a) chromosomal changes,**

**b) hematological changes,**

**c) reproductive effects, and**

**d) increased cancer incidence from the microwave irradiation in Moscow. All four of these effects had been found independently in other studies as well.**

So where does this leave us now, by no stretch of the imagination can you say the Robinette and Lilienfeld studies gives any assurance of safety of microwave transmissions from mobile phone towers, quite the opposite.

The ICNIRP statement Health Issues Related To The Use Of Hand- Held Radiotelephones And Base Stations makes conclusions on the safety of mobile phone base stations based largely on these two flawed studies.

Based on this information the answer to question no. 1) would have to be 'no'.

**Question no. 2 : (Is caution warranted? )**

In the Governments media release, announcing the \$4.5 million project, the Minister for Health and Family Services, Dr. Michael Wooldridge states: "While there is no substantiated evidence available to date of adverse health effects associated with RF EME exposure- within the standards that apply in Australia and overseas..."

Where is Dr. Wooldridge getting his information from?.... According to the press release, it must be from the EME Committee.

**There is ample evidence of adverse health effects, to warrant concern, when one looks at what few epidemiological studies that have been done to date on RF/MW human exposure.**

The catch word in Dr. Wooldridge's statement is "substantiated" evidence. This essentially means proven evidence, so that there is no doubt about the connection.

To use the term "proven" or "substantiated" is somewhat misleading. Epidemiological studies on human populations do not look for "proof" or "substantiation" but increases in incidence of a disease, or relative risk ratios.

The following recent studies do not "substantiate" anything in relation to exposure to RF/MW; they are dealing with the increase in incidence of adverse health effects such as cancer.

Epidemiological studies on tobacco and asbestos did not "substantiate" that these carcinogens cause cancer, they do show however, a significant increased risk of developing cancer from exposure. This is not "substantiation," but that did not prevent the health authorities from taking corrective action.

It is unfortunate that with electromagnetic radiation however industry and its supporters insist an absolute connection must be found before corrective action be taken.

The following are some relevant studies which should be of interest to anyone involved in EME health issues and who are concerned with a possible association with the human population.

a) The recent Bruce Hocking preliminary study compared cancer rates in three municipalities within a 4 km. radius of the Sydney TV towers with rates in adjacent areas further out. The study found children living within the 4km. radius had a relative risk of 1.61 for leukemia, compared with the control group. The relative risk for mortality was higher, at 2.25, and highest at 2.84 for fatal lymphoblastic leukemia.

The calculated power density levels within the 4 km. area were calculated to be in the order of **0.02 to 8 microwatts/sq.cm.**, up to 1000 times less than the Australian RF/MW safety standard of **200 microwatts/sq.cm.**

b) In 1987, a similar study identified higher rates of cancer among those living near the TV and radio broadcast towers in Honolulu, Hawaii. Drs. Bruce Anderson and Alden Henderson of the Hawaii Department of Health found in a study of several thousand people in residential areas with about 12 communication towers in the midst, a relative risk for cancer, including leukemia, of 1.375 (37.5% increase). **This study was never followed up.**

c) An earlier study in 1982, conducted by Dr. William Morton of the University of Oregon's Health Sciences Centre in Portland, Oregon found parallel trends in his study of cancer and broadcast radiation in Portland.

d) Dr. Stanislaw Szmigieski, a leading epidemiologist with the Centre for Radiobiology and Radiation Safety at the Military Institute of Hygiene and Epidemiology, Warsaw, Poland has been the team leader for an on-going study of the health effects of RF/MW exposure of military personnel in Poland for the whole military population. His research found that young military personnel exposed to RF/MW radiation had more than eight times the expected rate of leukemia and lymphoma. Careful surveys of exposure revealed that 80 - 85% of the personnel were exposed to an average of less than **42 micro watts/sq.cm.**, with a median point near **7 micro watts/sq.cm.**

e) Ouellet-Hellstrom and Stewart (1993) found a statistically significant 3.3 fold increase of miscarriage amongst U.S. physiotherapists using microwave diathermy compared to a non-exposed control group. The incidence increased with the number of monthly treatments, which

could suggest a cumulative effect. At an average of about 10 treatments per month the estimated average exposure was about **0.04 to 0.56 micro watts/sq.cm.**

f) Shandala et.al. (1979) found that calcium ion efflux varies in living animal cells at **10 micro watts/sq.cm.** and this level also produces brain activity changes.

g) von Klitzing (1995) found changes to human brain EEG with a signal of 217 Hz modulation on a 150 megahertz (MHz) carrier with an external exposure of about **2.5 micro watts/sq.cm.**

h) Dr. John Goldsmith, professor of Epidemiology at Ben Gurion University of the Negev, Isreal (mentioned earlier) has collected evidence of several occupational and military exposures to microwaves which produced elevated risks of a wide range of cancers, including childhood leukemia in the children of staff, and cancers in the staff and partners at the U.S. Embassy in Moscow and other eastern European U.S. embassies. These cancers were associated with a reported maximum exposure of between **5 and 15 micro watts/sq.cm.** and mean exposures between **1 and 2.4 micro watts/sq.cm.,** recorded near the outside walls of the embassy. Exposures inside the building should be somewhat smaller than these readings.

To quote from Dr. Neil Cherry's recent paper of March 1996, *Potential and Actual Adverse Effects of Cellsite Microwave Radiation:*

**"With these and dozens of other epidemiological studies of large populations and large numbers of workers occupationally exposed to RF/MW radiation, showing statistically significant increases of a wide spectrum of cancers, there can be little or no doubt that chronic low level exposure to RF/MW radiation produces increased cancer risk."**

Considering these studies and the evidence for an increased cancer risk, at levels well below the current Australian RF/MW standard of 200 micro watts/sq.cm. , for Dr. Wooldridge to state that "there is no substantiated evidence available to date of adverse health effects"..."within the standards..." indicates that he is not getting proper advice.

### **Question no. 3:**

**"Will the World Health Organization's International EMF Project be able to answer the above questions after its 5 year study?"**

As mentioned in the previous article, the WHO EMF Project will not be conducting new research, but will only be reanalyzing previous studies . It was also shown that most of these laboratory studies are not relevant to low level radiofrequency/microwave exposures and the development of cancer in humans. Therefore the relevance of the WHO Project is very limited, as far as giving us any real answers is concerned.

I'm not saying that the WHO Project should not be supported, but its limitations should be realized by the current government. If the government wants better value for its money it would seem wiser to put most of the \$4.5 million into practical, on the ground, "getting test tubes wet" research in Australia and supporting similar research in other countries. Hopefully the Australian EME Committee is planning this, but lets not skimp on it though. Practical research should be the main focus of the \$4.5 million. As far as producing up-to-date fact sheets, maybe we should get some answers first.

## Article 6

### **Australian Democrats firm on mobile phone health.**

The Queensland division of the Australian Democrats met on 31 August 1996 and passed a unanimous motion that states:

**"The Australian Democrats strongly oppose the construction of telecommunications towers in areas where children gather for long periods.**

**1.) The Queensland Division of the Australian Democrats call for a moratorium on sitings of telecommunications towers on or near school grounds, day care centres and kindergartens.**

**2.) The Queensland Division of the Australian Democrats will implement a strong 'on the ground' research program designed to gauge community awareness of, and health effects on, the public.**

**3.) The Queensland Division of the Australian Democrats encourages the common sense policy of telecommunications carriers sharing their facilities rather than the current duplication of infrastructure. This simple action will reduce dramatically the number and proliferation of telecommunication towers within the community.**

A 'potential public health risk' information kit from Democrats' Leader and Queensland Senator Cheryl Kernot was issued to child welfare groups and every local government body in Queensland.

Australian Democrats State Environment spokesperson, Hetty Johnston said: "This kit contains the latest information and scientific opinion on the potential hazards associated with electromagnetic radiation, such as those emitted by mobile phone towers. Ignorance must not be an excuse for government inaction on this potential threat."

Ms Johnston noted that in May this year, the President of the AMA (Australian Medical Association) David Weedon, expressed similar concerns in a letter stating: "In my view the "jury is still out" on the health effects of electromagnetic radiation with the strong likelihood that there is a slight risk of leukaemia."

Ms. Johnston said that all technology carries with it some element of risk to the community. However, a genuine risk-benefit analysis must accompany any decision to introduce, endorse or expand technology.

Consideration of the potential risk to public health must be paramount in the decision-making process. Past experiences such as the asbestos and thalidomide tragedies should not be forgotten," Ms Johnston warned.

(from press release of 2 Sept. 1996)

## Article 7

### **Sydney Council proposes guidelines for siting of mobile phone towers.**

In September 1996 the Environmental Services Department of the Sutherland Shire Council prepared a *Draft Interim Policy - Siting of Microwave Towers in Sutherland Shire*. The council feels that notwithstanding the exemptions given the telecommunications carriers from compliance with state and local regulations by the Telecommunications National Code, the code still requires the carriers to consult with local governments and the community (provided the council requests it).

As such, local governments should have a policy in place to protect the rights of community members. During the month of October 1996 the Draft Interim Policy is on exhibition at the council chambers for public and industry comment.

To quote from their Report in brief:

"The Telecommunications National Code requires that mobile phone carriers are required to consult with the community in relation to installation of mobile phone base stations.

"Council has encouraged the siting of such stations away from residential properties, and preferably within industrial, business or recreational areas.

"...While the full impacts of microwave exposure are not understood, it may be possible, with appropriate public and industry consultation, to provide a precautionary approach on siting, based upon existing research. Protection of public health and the natural environment may be undertaken in a more effective way via the development of an interim policy.

"The draft interim policy below proposes establishment of a site specific guideline for exposure of the public, and several land-use procedures to minimize human and natural environment impacts. It has been produced with the additional goal of enabling telecommunications needs to be met efficiently.

"Some public discussion about the non-thermal impacts of microwaves on humans, (much of it based upon recent discussions in New Zealand regarding acceptable precautionary public exposure limits to microwaves), has supported an interim precautionary exposure limit of around **0.1 to 0.2 microwatts/sq.cm. (uW/sq. cm.)**.

"This is approximately 1000 times more conservative (lower) than the current Australian Standard which is based on thermal impacts and safety factors. A defacto assumption to the effect that a 300 metre distance between microwave base stations and residences would meet such an interim standard has also been put forward publicly."

"Council is not in a position to endorse these exposure levels as acceptable for protection of public health. However, it is considered that for many base stations in industrial, business, or recreational areas, a 300 metre buffer zone to residences would enjoy public confidence with respect to minimizing public health risks, and can be incorporated with effective planning, such that effective base station operation is not prevented.

"It is understood that for digital base stations the ground level exposures adjacent to 20 metre high microwave base stations are routinely lower than 0.2 uW/sq.cm.

"On that basis, it would be possible to envisage an interim guideline for development agreement purposes whereby new microwave base stations are only sited in residential areas where maximum available distances from residences are employed, and where average annual exposures to the public would be below 0.2uW/sq. cm.

**"As a further precaution, it should be possible to avoid siting base stations within 300 metres of a sensitive use (school, kindergarten, play centre, hospital or aged care centre)."**

## Article 8

### **Billion dollar windfall from RF/MW spectrum Auction?**

The forthcoming auctioning off of new portions of the microwave spectrum in the 18 Gigahertz band for new mobile phone carriers promises a new era for telecommunications technology, according to reports from Spectrum Management Agency (SMA).

The auction, being conducted by (SMA), the authority charged with management of the RF/MW spectrum in Australia, could raise between \$900,000 million to \$2.6 billion, according to estimates from the Centre for Telecommunications Information Networking.

(The Bulletin, Sept. 3, 1996)

## Article 9

### **ALGA dismisses Telecommunications Code as a sell out.**

From News Release, dated 4 August 1996) :

"The Australian Local Government Association has dismissed the draft Telecommunications National Code as a sell out to the powerful carriers at the expense of local community interests.

ALGA President Mayor David Plumridge said "the long-awaited draft code has failed to pick up any of the major recommendations from the Austel Review."

"The draft Code has also totally ignored Local Government proposals for giving priority to sharing underground ducts and cables, co-location of facilities and ensuring an effective dispute resolution process."

"Clearly Senator Alston is not prepared to stand up for the demands of the community to protect their environment from the onslaught of the cable roll-out."

"Mayor Plumridge said that "the draft code encourages carriers to continue with their 'cheap and nasty' cable roll-out - a 'horse and buggy' expedient in a country that claims to be "smart" and at the forefront of new technology."

"Add to that the sheer stupidity of duplicating a network and it is obvious that successive governments have sold us out" a frustrated Mayor Plumridge said.

To make matters worse Telstra have now been forced to abandon their underground upgrading and go overhead to keep up with Optus who refuses to even talk about co-location and sharing options for their local networks.

"The Labor Government created the problem but the Coalition has failed to deliver on its election promise to strengthen the draft National Code and promote the use of co-located cables and towers"

The ALGA, on behalf of councils across Australia has analyzed the draft Code and made a comprehensive submission to AUSTEL. The Government's contempt of local communities is further demonstrated by the "ridiculously short time for consultation."

Contact: Mayor David Plumridge AM, President, Australian Local Government Association

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## Article 10

### **Draft Telecommunications Code**

(Article reprinted from EMRAA News, Sept. 1996 )

When finally it appeared, unheralded, in July the new Draft Telecommunications Code lived up to expectations. It was long, couched in language not conducive to easy assimilation, gave the public just ten days to respond and provided the wrong fax number for submissions! Worse, it contained little joy for the community regarding the siting of telecommunications facilities.

The following is a brief rundown of the provisions of the new Code and its implications for community health. The objects of the 1996 document remain unchanged from the 1994 Code and contain no reference to the health or safety of the community.

The new Code requires carriers to co - locate new facilities, either cables or towers. While EMRAA believes that the co-location of above ground cables (if we must have them at all) is a good thing, we are concerned that co-location of telecommunications towers will result in a considerable amplification of radiation emitted from each site, to the detriment, possibly, of the surrounding community's health. Co-location does not apply, however, to activities notified under the old Code. (Could it be just coincidence, then, that Optus proceeded, with lightning speed, to notify councils in Sydney, Brisbane and Melbourne of its intentions to proceed with cabling, just prior to the release of the new Code?)

The Draft Code requires carriers to comply with some recommendations by Council, Heritage Commission or State/Territory governments . However, it does not give these authorities the power to prevent the activities of the carriers and, worse, it gives the carriers three avenues for escape. They can ignore recommendations of the authorities if the carrier feels they are not feasible on (i) economic grounds, (ii) technical grounds or (iii) they would be incompatible with the configuration of its telecommunications network.

Unlike the other Code, the new document requires carriers to prepare a corporate environmental plan which is to be made publicly available. The plan should outline measures the carriers will undertake to minimize pollution, adverse health effects, unnecessary use of resources etc.

Carriers are obliged by the new Code to provide notice of their activities to the relevant State/Territory authority, Chairman of the Heritage Commission, Secretary of the Department of Environment, Sport and Territories and - an innovation in this Code - pay an application fee to the local council.

Notification to the public, however, is not a matter of course. This Code provides that a State/Territory authority or the Chairperson "may decide"...in the case of a proposal of high or medium impact - whether the public should be notified of the proposal and, in the case of a proposal of high impact, whether the community should be consulted on the proposal. Moreover, it gives the Secretary the right to decide that "a proposal should not be publicly reviewed."

EMRAA is outraged by this disregard for community right -to -know and demands that the community be consulted on any proposal that relates to its health, environment or the anesthetics of an area. In the event of objections being lodged by community or councils, the Code provides only for a voluntary response from the carriers. There is no obligation on them to modify proposals, nor any independent arbitrator in disputes.

The Code provides that AUSTEL "is authorized to give written directions to a carrier about how the carrier should comply with its obligations under the Code."

However, AUSTEL does not have the authority to deal with infringements of the Code, nor is it interested in doing so. (We are informed that no fines have ever been imposed on a carrier despite breaches of the Code.) EMRAA does not believe that the powers of AUSTEL are adequate to guarantee the rights and the safety of the community.

Finally, the Draft Code is based on Australian Standard 2772 which considers only the thermal (heating) effects of radiation and not the more subtle athermal effects that EMRAA believes may affect health. AS 2772 requires the measurement of only one frequency at a time and makes no provision for the cumulative effects of the multiple frequencies to which people are constantly exposed. Moreover this Standard is effectively meaningless, as all telecommunications towers for mobile phones and TV aerial cables would easily comply with it, perhaps by a factor of 100 or more.

EMRAA regards the Draft Telecommunications Code, to our immense disappointment, as window dressing for the existing unpalatable formula of favouring the rights of industry over those of the community. Essentially, as in the previous Code, it allows carriers to conduct "prescribed activities" without regard to state/territory, council or community concern. This is not only undemocratic, but indirectly contravenes Senator Alston's promises when in Opposition.

EMRAA challenges a fundamental objective of the Code that of "facilitating the rapid development of efficient telecommunications network infrastructure..." We believe that giving carriers powers to override normal State and Territory planning and environment laws, in the interests of speed, is grossly negligent. Furthermore, it contravenes common sense. Let's ensure that the technology is safe first, before we install it at breakneck speed !

The Draft Code reflects virtually no acknowledgement of the considerable threat that telecommunications facilities may present to human health. In the light of increasing scientific evidence linking health problems to EMF/EMR exposure, we believe that community health should be a primary consideration in deciding where to locate and how to build facilities. We believe, too, that funds should be allocated for more research into the health effects of EMR exposure.

EMRAA News is published by the ElectroMagnetic Radiation Alliance of Australia. Contact through the Sutherland Shire Environment Centre, PO Box 589, Sutherland 2232 NSW. Ph (02) 9545 3077 Fax (02) 9542 3580



## Article 11

### **DOCA Committee not serious about consultative process.**

Late in 1995 the Australian Federal Government's Department of Communication and the Arts (DOCA) convened a committee on "Electromagnetic Energy and Public Health". This committee was created in response to the increasing level of public awareness as to the possible health hazards from ELF and RF/MW electromagnetic energy.

This committee has been having various public meetings where selected representatives from several community groups opposing mobile phone towers were invited to make submissions and provide community input into the committee's decision-making process.

Initially it appeared that this committee was seriously taking note of these concerns and would be making positive recommendations to DOCA, taking into consideration community concerns. However recently at the end of August, in committee meetings in Melbourne and to a lesser extent in Sydney any appearance of co-operation was shattered.

According to interviews with four community representatives to this committee, all the evidence, and documentation, indicating possible health hazards submitted to the committee by the community groups (including the Hocking study, the Neil Cherry report, etc.) were criticized and arbitrarily rejected for consideration by the committee.

According to these community representatives, the DOCA EME committee apparently considers any future EMF/EMR research studies to be a low priority and will only consider the eventual findings of Dr. Michael Repacholi's World Health Organization (WHO) international EMF Project ([see WHO article](#)), which the DOCA committee believes will provide definitive answers to the health hazards questions, from the ELF powerline frequency to the microwave mobile phone frequencies.

It is important to note that this WHO study is not conducting any further research but only re-examines those previously done studies and as such is only a rehash of the same old information. As one researcher remarked to me, "this kind of thing has been done to the death".

The inadvisability of waiting for the 5 year WHO study to give urgently needed answers to the mobile phone health hazards issue is obvious when one realizes that practically all of the studies to be re-examined by the WHO are irrelevant to the safety (or not) of mobile phones and base stations.

Almost all of existing studies deal either with the extremely low frequency (ELF) end of the electromagnetic spectrum or with acute short term exposures to RF/MW electromagnetic radiation and not with the biological effects of chronic exposure to the low power microwave frequencies used by the mobile phone system.

This lack of relevant existing scientific knowledge is mentioned in the June 1994 *CSIRO Report on the Status of Research on the Biological Effects and Safety of Electromagnetic Radiation: Telecommunications Frequencies* where it is stated that:

**"Although there has been no epidemiological study completed specifically addressing the higher frequency range used for telecommunications** there have been some reports of increased incidence of tumours in animals exposed to microwaves together with a known carcinogen."

As far as the relevance of the studies to be re-examined by the WHO to actual human health issues it is important to look at what the International Commission on Non-Ionizing Radiation Protection (ICNIRP), chaired by Dr. Michael Repacholi, states about these same studies:

"Most of the established biological effects of exposure to RF fields are consistent with responses to induced heating, resulting in rises in tissue or body temperature of greater than one degree C. (UNEP/WHO/IRPA,1993).

Most studies examined endpoints other than cancer, many examined physiological and thermoregulatory responses, effects on behaviour and on the induction of lens opacities (cataracts) and adverse reproductive outcome following acute exposure to relatively high levels of RF fields. **Very few studies are relevant to the evaluation of RF exposure on the development of cancer in humans."**

Considering this, there is limited benefit in the Australian government giving money for the WHO EMF Project where by definition it can tell us nothing new and cannot provide the answers to the real questions?

One thing the WHO EMF Project does provide however is time for the telecommunications industry to establish its infrastructure, and it also allows time for protests and opposition to be exhausted.

Does it really make sense to wait five years for the WHO and Repacholi to give, in effect, yesterdays answers to questions which they cannot possibly answer, **because the necessary research to answer these questions has not yet been done?**

Meanwhile the proliferation of mobile phone towers and other RF/MW transmitting technology continues, with real concerns as to whether or not any real "on the ground" research will be conducted in Australia to determine its safety.

One example of this new technology is a new class of short-range computer communications devices that operate at 59 to 64 GHz, and could expose operators to levels in excess of 5000 micro watts/ sq. cm.( The Australian limit for public exposure is 200 micro watts/sq. cm. and for occupational exposure 1000uW/cm.sq.).

Hewlett-Packard, the manufacturer of this equipment, has stated to the U.S. Federal Communications Commission (FCC) that setting an exposure limit of 5 milliwatts/sq.cm.(5000 micro-watts) would make their technology "impractical", and unnecessary because "**scientific**

**data simply does not exist for health effects of power levels at these frequencies"**. Microwave News March/April 1996 page 9.)

This line of reasoning leads to some interesting comparisons. For instance, how far would a pharmaceutical company get if they tried to market a new, untested drug and argued for its safety because no scientific testing has been done and therefore there is no evidence of ill effects !

Getting back to the DOCA committee, any answers as to health effects issue being left up to Dr. Michael Repacholi and the WHO EMF Project is of concern to many scientists (including Dr. Ross Adey), researchers and concerned individuals as Dr. Repacholi has many times testified in hearings on behalf of the power and telecommunications industries.

He has also previously expressed an opinion that there are no athermal (low level) biological effects and always sides with the industry in issues of adverse biological effects. He has also frequently referred to two studies, Robinette (1980) and Lilienfeld (1978) as evidence of a lack of adverse health effects associated with human exposure to RF/MW radiation.

However both of these studies have been found to be severely flawed and are considered by many scientists to be biased (See page 6). As a result of this, his impartiality is very much in question.

It would seem that money spent financing the WHO project could be better spent in actual research and not just going over old ground. There are concerns that the DOCA EME Committee is placing far too much faith in the WHO Project without understanding its limitations.

It is a bit puzzling that Mr. John Neil, from DOCA, who is Australia's representative on the WHO project made the remark at the Melbourne DOCA committee meeting that EME health research was of low priority!

It is also of concern that the chairperson of DOCA's public committee meetings has sent out translations of a German information sheet on RF/MW radiation (titled RADIO SIGNALS) which absolutely dismisses the health hazards issue.

Will DOCA use this as a model for their own soon to be published information sheets? The following statements from this German information sheet illustrates, in my opinion, that the DOCA EME Committee is not taking seriously the complexity of this issue.

"That radio technology has been in use for almost 70 years with no proven health hazards to human beings or to the environment is a fact that is often overlooked. Intensive research in this area has yet to establish a hazard."

"...only an open and objective approach to researching this issue will yield arguments that convince the general public of radio technology's safety and usefulness." ...

"Electromagnetic waves are natural in the truest sense of the word."..."In addition to the thermal effects of electromagnetic waves, there are the so-called non-thermal effects. These, however have been found only in X-rays and gamma rays which, due to their high energy, can be dangerous to human beings if over-exposed..."

" To date, research into electromagnetic radiation indicates that electromagnetic systems, when used as directed, pose no health hazards."

To find such an unscientific, biased document, which ignores a large body of evidence in dismissing any health hazards, being presented as scientific report from a DOCA representative should be cause for concern. Does this represent DOCA policy, and will this be the opinion taken in their own information sheets, currently being pre-paired for the Australian public?

## Article 12

### **Australian research shows electromagnetic radiation causes changes to genetic makeup.**

At an EMF Scientific Workshop, held in Melbourne, on October 17, 1996, and hosted by the Electricity Supply Association of Australia Ltd. (ESSA), Dr. Peter French, Principal Scientific Officer of the Centre for Immunology, St Vincents Hospital, Darlinghurst, Sydney, reported on his recent research.

In a presentation titled, *Effects of exposure to electromagnetic radiation at 835 MHz on cellular growth, morphology, secretion and gene transcription*, Dr. French's research indicates that exposure to electro-magnetic radiation causes changes to genetic makeup.

Gene transcription - the ways in which genes are activated to form different types of protein, eg. those specific for liver, skin, etc. - appear to be affected by electromagnetic radiation. Some DNA expression is turned on and some turned off as a result of exposure. The shape of cells, their secretion and growth rates have been shown to change by exposure. The following is from the abstract of Dr. French's presentation.

"Effects of "non-thermal" levels of electromagnetic radiation at 835 MHz were studied using cells grown in the laboratory. Three cell types were used; a rat mast cell line, RBL-2H3; a human malignant glioblastoma line, U87-MG; and a human primary endothelial cell culture, HUVEC. The exposure system consisted of a crystal controlled solid state microwave generator with a central frequency of 835.10 MHz. Output was via a 50 Ohm coaxial cable connected to a circular antenna approximately 9.5 cm. diameter. The antenna was mounted in the centre of a cubical Faraday cage and cells were exposed within the Faraday cage. Cultures were allowed to cool to ambient temperature during the exposure period."

#### **MAST CELLS:**

"A mast cell line, RBL-2H3, was exposed for 20 minutes, 3 times per day for 7 days at power densities of 4.5 and 9.6 mW/cm<sup>2</sup>. From day 4 onwards, it was observed that the rate of DNA synthesis and cell replication increased, that actin distribution and cell morphology became altered, and the amount of b-hexosaminidase (a marker of granule secretion) released in response to a calcium ionophore was significantly enhanced, in comparison to unexposed cultures.

There were no effects seen on levels of cytoskeletal protein synthesis or of b-actin mRNA. However, using the technique of differential display, changes in the level of several mRNA bands were observed, indicating an effect on the process of gene transcription. Morphological changes persisted following subculture for at least 14 days in the absence of further exposure."

## **MALIGNANT GLIOBLASTOMA CELLS:**

"A human astrocytoma cell line, U-87 MG, was exposed to 835 MHz for 20 minutes, 3 times per day for 7 days at a power density of either 50 mW/cm<sup>2</sup> or 9.6 mW/cm<sup>2</sup>. At the lower power density, it was observed that the rate of DNA synthesis decreased, and that the cells flattened and spread out in comparison to unexposed cultures. At 50 mW/cm<sup>2</sup> there were no effects seen on cell proliferation, but alteration in cell morphology included increased cell spreading and the appearance of actin- containing blebs at localized sites on the membrane. It is hypothesized that 835 MHz at the lower power density may be affecting a signal transduction pathway involved in cell proliferation."

## **ENDOTHELIAL CELLS:**

"Exposure under the above conditions caused alteration in endothelial cell morphology, but did not cause any alteration in growth rate."

"The results of this study indicate that there are cell-type specific differences in response of cells to exposure to electromagnetic radiation at 835 MHz at intensity levels which do not cause heating of the cell culture medium."

The fact that effects on gene transcription can be detected at the mRNA level may have important implications for industries and users in the area of EMF's in general, and telecommunications in particular."

I rang Dr. French about the implications for mobile phone users, since the power levels used in his study are greater than one would be exposed to using a phone with the antenna placed against the head.

His reply was that further refining of the measuring process and using lower power levels comparable to levels mobile phone users may be exposed to are giving similar results as found at the higher levels.

This is worrying evidence that low level (non-thermal) exposure, similar to that from a hand held analogue phone of 835 MHz is having an effect on human cells. Dr. French has not yet conducted experiments with digital phones but thinks that similar or stronger impacts may apply, since the radiation is stronger and the pulsed modulated fields are likely to have more biological effect.

Obviously this study raises far more questions than it answers, hopefully these questions will be answered with the help of Australian government research funding.

## Article 13

# **Health Effects Update On Powerlines, Electrical Equipment & Other Aspects of Electromagnetic Fields.**

**by James B. Beal (October 1996) EMF Interface Consulting.**

Latest research (not influenced by electric company funding) indicates that your local power line is not the primary source of 'electromagnetic pollution'. Home and business interior wiring, equipment or appliance motor and transformer EMF sources, and grounding to metal pipes seem

to play a much more important part, especially where we spend hours of our time in one place, working or sleeping.

The intensity of the alternating current (a.c.) and associated EMF present is only one of several factors to consider in a large number of environmental variables!

There appear to be trends in animal, primate, and human research over the years which indicate that continual long-term EMF exposure of individually-specific pulse rates, intensities and waveforms, may produce hypersensitive reactions in the living systems exposed [1-4, 7-10, 19, 21, 25, 26].

Persons already hyperallergenic to many chemicals claim that EMF sources from nearby powerlines, home appliances, transformers, and switches are one more irritating factor to avoid. These trends have caused popular concern, controversy and confusion, stimulating government, industry, and legal actions regarding the biological effects of power frequency electric and magnetic fields [15-18, 24].

Research programs are finally beginning to investigate the unwanted raw signals (transient spikes & surges) coming in on your local power lines or generated by home appliance and wiring. Interest is being focused on the sharp pulse repetition rates (how many times per second), and what other frequencies or waveforms are present besides the normal 60 cycle [also, called Hertz (Hz)] power line frequency.

Information about the length of exposure time, when the exposure occurs (especially at night), the EMF field intensity (milliGauss), and the interactions with people and other living systems in the environment is now being gathered. We are becoming more aware in recent months of the sensitivity of various life forms to EMF via their sensory system reactions [20], immune system effects [8,9], allergy reactions [10,21], etc. So it is not simply 60 Hz magnetic field strength, as indicated by a.c. milliGauss meters, that determines whether or not a given EMF will have biological effects.

Undesirable transients on the power line and in the home or business will vary, depending on what is switching on and off, how often, how long and when (day or night, weekdays or weekends). Five recent epidemiological studies in the United States and Sweden [6,14] have shown weak, but consistent, cancer correlations with proximity to transformers, the local wiring code and the number of appliances in the home. Because a specific subject EMF sensitivity profile has not been developed yet, it is likely that the weak epidemiological results were diluted by the overall test population chosen, and the variability in human immune system response to irritating stimuli.

Repetitious transients and surges (pulse spikes) are not only conducted from power lines into, but also created by, factors in home and business wiring, appliances and equipment. This repetitious long-term exposure may provide a kind of irritation or suppression factor, posing potential hazards to our health. EMF effects have been discovered, at night, reducing brain pineal melatonin hormone production, which affects immune system efficiency, especially in older persons [8,9].

These effects appear to be caused by the sharp rise and fall of the pulse spikes created by motors and switches (electric blanket thermostat switch, for example) turning on and off. That's the reason for 'prudent avoidance' of operating electric blankets and water bed heaters by children and pregnant women. Dr's Wilson and Reiter made these discoveries during the past year at Pacific Northwest Laboratory and University of Texas Health Science Center, respectively [7,8].

This points to a probable irritating or suppressing type of influence which would create symptoms in a variety of confusing ways, due to personal health and immune system factors [4]. Persons at risk would be those exposed for years in constant proximity to power line components (transformers, sub-stations), appliances (electric blankets, hair dryers), power tools, switching systems, and other sources of potential rapid transient (switching) EMF [1].

There is strong stimulus-response evidence, verified by eye pupil variations, that continual long-term exposure can result in allergic reactions to EMF of particular pulse rates, intensities and waveforms [10,21]. Environmentally ill (EI) persons with compromised immune systems, already hyper-allergic to many chemicals, often find that EMF transients are one more irritating factor to avoid.

As more data accumulates on what EMF factors are the most hazardous, precision line surge suppressors, current balancing transformers [23], for control of voltage and current transients, may become increasingly important. These methods will be beneficial, not only for computers and critical electronic systems, but also in improving our personal long-term health. These devices would be on power lines, in industries and in the home. Motors, switches and switching systems will have built-in rise time suppression circuits so spikes would be eliminated or reduced. Proper grounding, and complete cut-off (pull the plug or breaker) of unused electrical systems are approaches used by EI persons now in their business, sleeping and major home activity areas.

### **Future Shock, Prizes and Surprises from Bioelectric and EMF Research:**

There are many beneficial, as well as potentially hazardous, biological interactions with the artificial EMF and natural (geomagnetic) environments in which we live and work. It has long been established (30+ years) that electromagnetic therapies of controlled specific pulse-type (sharp rise time or square-wave) waveforms and pulse rate frequencies can produce visual [5] and hearing effects [22] (without lights or speakers), induce sleep and anesthesia, suppress pain, ease depression, improve tissue and bone growth healing [19] and successfully treat addictions to hard drugs, alcohol and tobacco.

The applications mentioned above are considered the body-penetrating effects of the magnetic field pulsing components and have been primarily conducted in other countries. Electromagnetic therapies appear to be rapidly emerging as the medicine of the future.

In this country the electric field is not considered a health factor, because it does not penetrate the body. However, note that the acupuncture system, found in all living things, is associated with healing. It is more primitive than the nerve system [19], and has discrete electrical components that change slowly with time. It appears to be affected by mind, body and environmental changes, and thus may respond to electric field changes (natural and artificial). Perhaps the acupuncture total body surface system acts as a sort of 'transceiver', transmitting and receiving subliminal information on many different levels about EMF variations (external and internal) which may then stimulate (or indicate) body, mind and healing reactions.

The information transmitted from the life processes of biosystems (microorganisms to elephants), plays a survival role in detection of food, enemies, and mates. The information transmitted to biosystems from the natural earth (geomagnetic) environment also seems to play a survival role in navigation, migration, biological rhythms, and anticipation/detection of weather and earth changes, both subtle and catastrophic, e.g., seasonal variations, weather fronts, hurricane/tornado proximity, and earthquakes [2,3,20]. How much of this information do we humans use or react to unconsciously in our daily life and how much is latent talent which can be trained?

Consider the sensitivities of the Australian aborigines and martial arts masters. As understanding increases about our health dependence on natural and artificial EMF factors, our environmental awareness will be increased.

Thousands of research reports on bioeffects of low-power extremely low frequency (ELF) EMF, radio frequencies (RF) and modulated (mixed frequency) fields on humans and other living systems have been missed because they were not published in medical journals. Some of the best reports are in journals relating, not primarily to the research results, but to the methodologies involved, e.g., appearing in industrial, electronics, physics, communications, life sciences, and obscure specialty publications [3,4,6,12,13,20,21,25]. How does one publish original research in a new area with few or no peers available for 'peer review', as required in the established medical and scientific journals?

In addition, the physical and mental problems reported for the phenomenon known as 'sick building syndrome'(11) may involve long-term exposure to variations and mixtures of ELF/EMF along with improper light spectrum balance, and low frequency sound or vibrations, as well as poor air circulation and chemical irritants/pollutants.

Sensitive, inexpensive, portable EMF measuring, recording, imaging and analysis systems have recently evolved from space and satellite research programs. The use of Expert Systems to process large numbers of variables, miniaturized 'smart' sensors for continuous monitoring, and high-resolution imaging systems, now provide us the opportunity to study the long-term, low exposure rate, multi-faceted, complex challenges to health that are being encountered in this culture.

**NOTE:** See "Bioelectromagnetics: Health Effects Update About Powerlines, Electrical Equipment & Other Aspects of Electromagnetic Fields (EMF)," (1996 Edition-32 pages), edited by James Beal, for more details and references about health research, and applications of bioelectromagnetics, epidemiological results, EMF and environmental illness, detection and prudent avoidance of strong fields, and EMF Hypersensitivity.

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## Article 14

### **Agreement to limit EMF levels in libraries sets precedent.**

In June 1995 the Australian Services Union (ASU) and library equipment manufacturer RAECO signed an Australia wide agreement that the Union feels will protect ASU library members from exposure to high electromagnetic fields which has been found in some library security systems.

The signing of the agreement on 22 June 1995 culminated several months work by RAECO and the ASU Occupational Health & Safety Officer Peter Wilson and ASU representative Andrew Blease.

During this time the problem was extensively examined with expert advice from Mr. Brian Lennon from Deakin University. This led to the development of a strategy that will see that no ASU member is exposed to a magnetic field of more than 4 milliGauss (mG) averaged over a

normal working day. The agreement came about as a result of some studies that have suggested there may be a link to an increase in susceptibility to some cancers and exposure to electromagnetic fields.

The agreement means that RAECO will provide purchasers with information and installation advice that will meet the objective of ensuring that no user is exposed to a daily dose of more than 4 milliGauss from equipment supplied by them.

From the Agreement:

"Current studies indicate that Extra Low Frequencies (ELFs) increase susceptibility to cancers, they do not generate cancers. It is thought that ELF's "degrade" the immune system. This susceptibility to cancers is only during the period of exposure, it doesn't result in permanent degradation of the immune system. Therefore the longer the exposure, the longer the opportunity for the cancers to take hold. The current understanding is that greatest exposure risk is to the head and torso.

Current evidence suggests health problems could arise with prolonged exposure above 4 mG.

Taking into account the above information the parties have sought to develop recommendations that will ensure no operator is exposed to an average ELF of more than 4 mG over their working day. Peak exposure levels will be determined in consultation with agreed expert advice. For this purpose the ASU agrees to accept Mr. Brian Lennon from Deakin University as the expert advisor."

For copies of the full agreement or further information contact the ASU Victorian Authorities and Services Branch, 116 - 124 Queens-berry Street, Carlton South, Vic. 3053, or ring the ASU Occupational Health & Safety Officer, Peter Wilson on 03-93471955.

## Article 15

### **New Zealand's history of public participation on environment issues extends to siting of phone towers.**

Local Autonomy for Siting Cellular Towers in New Zealand.

**(Reprinted from the U.S. publication Microwave News, Nov/Dec 1996)**

In contrast to the U.S., where a national radiofrequency and microwave (RF/MW) radiation standard has preempted state and local government rules for cellular tower siting, communities in New Zealand have adopted a variety of policies, including a 50uW/cm<sup>2</sup> public exposure limit and a minimum distance between antennas and homes.

New Zealand has a tradition of public participation in environmental issues, and this has encouraged local governments to be involved in siting decisions for cellular antennas, a process that some say is working well.

"Where a local authority has developed a policy on transmission sites, public concern has generally been met," according to *Public Authority Planning for Cell Phone Transmission*

*Facilities*, a report released by the office of N.Z.'s Parliamentary Commissioner for the Environment in September.

On the other hand, New Zealand's wireless industry - comprised of three providers: Telecom New Zealand, a subsidiary of the U.S.'s Bell South and Australia's Telstra - has been critical of the local councils, arguing that they have developed inconsistent policies.

The environment commissioner, Helen Hughes, recommends that local governments pursue a "prudent approach" for setting RF/MW radiation exposure limits for cellular towers, develop plans to protect both community concerns and industry interests, take into account high-risk groups when setting exposure limits for the public and devise strategies for monitoring RF/MW exposures.

New Zealand's Resource Management Act of 1991, which allows local governments to formulate their own environmental plans, has brought about a diversity of siting policies:

\*The city of Auckland has adopted a 50 uW/cm<sup>2</sup> exposure limit, which is stricter than the 200uW/cm<sup>2</sup> advisory guideline New Zealand adopted in 1990.

\*The city of Christchurch has maintained discretion as to whether transmitters may be erected within 300 metres of residential areas or entail exposures exceeding 50uW/cm<sup>2</sup>.

\*The city of Hutt requires that wireless companies get consent for any facilities sited outside industrial locations and then only if they can demonstrate that their transmitters comply with the New Zealand standard.

\*The district of New Plymouth permits antennas in industrial areas, but requires the district's consent to site them in rural areas.

\*The city of Waitakere, which was the first to adopt a bylaw with regard to RF/MW exposures, enforces the 1990 New Zealand standard for the general public.

Hughes suggests that the central government can assist local governments that do not want the burden of developing rules for antenna siting by setting guidelines and by urging industry to show that it is minimizing RF/MW exposures.

Although the report recognizes children as a risk group, it is silent on the issue of siting antennas near schools. New Zealand's Ministry of Health issued a report in August favoring prudent avoidance where children are concerned. Earlier this year, New Zealand's Ministry of Education issued a policy statement banning the placement of cellular antennas near public schools.

(Reprinted with permission Microwave News, Nov/Dec 1996)

## Article 16

### **New Zealand: More RF/MW Health Studies "Imperative".**

An independent report commissioned by New Zealand's Ministry of Health has called for more research to examine the potential health effects from exposure to RF/MW radiation. In the interim

the ministry advises taking "no-cost" measures to reduce exposures from wireless transmitters- especially for potentially sensitive groups such as children.

"It is imperative that the scientific issues be clarified as soon as possible, as there is much at stake," according to a report, *Literature Review on the Health Effects of RF Radiation*, which was published in August for in-house policy-making and is available on request. Reviews in Australia, Europe and the U.S. have reached similar conclusions (see MWN, S/094 and S/95).

The report, by Dr. Michael Bates of the Institute of Environmental Science and Research in Porirua and Drs. Marten Hutt and Alistair Woodward of the Wellington School of Medicine, cautioned policy-makers not to use the limited information on nonthermal RF/MW interaction to dismiss potential health effects: "There is a high level of scientific uncertainty, and the implications for policy-making depend largely on where the onus of proof lies: the epidemiological evidence may be construed as either 'incomplete evidence of cause' or 'incomplete evidence of safety.'"

The authors added that while there are no widely accepted biological mechanisms to explain health effects, it would be premature to dismiss these effects as biologically implausible. The review turned up strong evidence for electromagnetic interference with medical devices, but a dearth of research to link RF/MW exposure to leukemia, brain and lung cancers and effects on the blood, chromosomes, eyes and cardiovascular system. Additionally, studies on the female reproductive and nervous systems are inconclusive, according to the report.

## Article 17

### **PLEASE NOTE:**

There are two distinct areas of the electromagnetic spectrum covered in this publication:

1. The powerline frequency range of 50 or 60 Hertz (cycles per second) which falls in the extremely low frequency (ELF) range of the electromagnetic spectrum, which ranges from 1 to 300 Hz. [Electromagnetic Fields] In this range electric fields are measured in Volts per metre (V/m) and magnetic fields in Amps per metre (A/m). The magnetic portion, referred to as the magnetic flux density is measured in units of either Tesla or Gauss. For fields normally encountered in the environment units are in milli-, micro-, or nanotesla (mT, uT, nT) or if in units of Gauss, in milliGauss.(mG)
2. The radio and microwave frequency range (RF/MW). For radio frequency, this is 100 KiloHertz (KHz) to 30 MegaHertz (MHz). The microwave (MW) range spans from 30 MHz to 300 GigaHertz (GHz). [Electromagnetic Radiation] The usual unit of measurement for this range is for the power density level, expressed in units of watts per square metre ( W/m), milliwatts/cm sq. (mW/cm.sq.), or micro Watts/cm sq.(uW/cm/sq. Another unit is the Specific Absorption Rate (SAR) expressed as Watts/kilogram (W/k), which is the rate at which RF/MW radiation is absorbed in body tissues. The rate of absorption varies with frequency and body size but it is possible to determine approximately what intensity of the power density level produces a certain level of heating in the body.